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EPOS2 P 24/5

Positioning Controller

Cable Starting Set

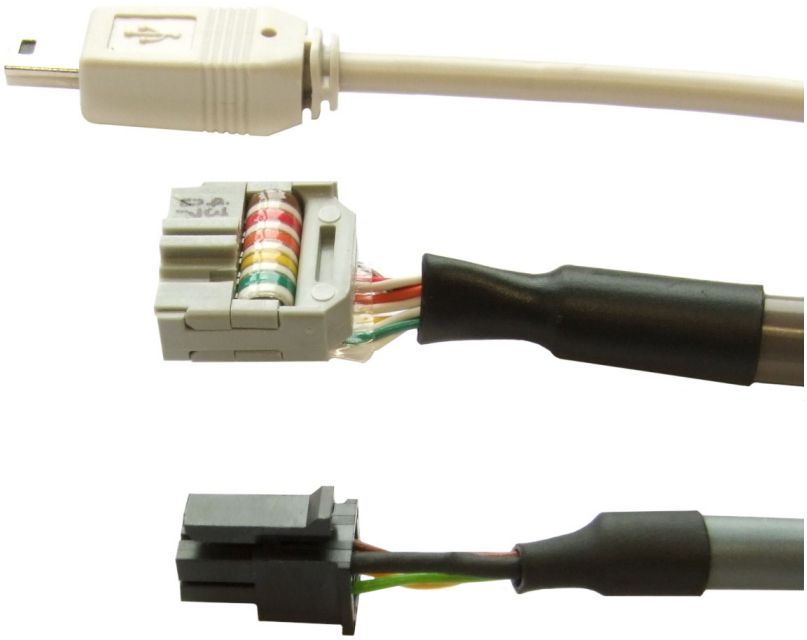

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TABLE OF CONTENTS

READ THIS FIRST

These instructions are intended for qualified technical personnel. Prior commencing with any activities…

- *you must carefully read and understand this manual and*
- *you must follow the instructions given therein.*

***The EPOS2 P 24/5** is considered as partly completed machinery according to EU Directive 2006/42/EC, Article 2, Clause (g) and **is intended to be incorporated into or assembled with other machinery or other partly completed machinery or equip-ment**.*

Therefore, you must not put the device into service,…

- *unless you have made completely sure that the other machinery fully complies with the EU directive's requirements!*
- *unless the other machinery fulfills all relevant health and safety aspects!*
- *unless all respective interfaces have been established and fulfill the herein stated requirements!*

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1 ABOUT THIS DOCUMENT

1.1 Intended Purpose

The purpose of the present document is to familiarize you with the described equipment and the tasks on safe and adequate installation and/or commissioning.

Observing the described instructions in this document will help you …

- to avoid dangerous situations,
- to keep installation and/or commissioning time at a minimum and
- to increase reliability and service life of the described equipment.

Use for other and/or additional purposes is not permitted. maxon motor, the manufacturer of the equipment described, does not assume any liability for loss or damage that may arise from any other and/or additional use than the intended purpose.

1.2 Target Audience

This document is meant for trained and skilled personnel working with the equipment described. It conveys information on how to understand and fulfill the respective work and duties.

This document is a reference book. It does require particular knowledge and expertise specific to the equipment described.

1.3 How to use

Take note of the following notations and codes which will be used throughout the document.

Notation	Explanation
(n)	referring to an item (such as order number, list item, etc.)
➔	denotes “see”, “see also”, “take note of” or “go to”

Table 1-1 Notations used in this Document

1.4 Symbols and Signs

In the course of the present document, the following symbols and sings will be used.

Type	Symbol	Meaning	
Safety Alert	 (typical)	DANGER	Indicates an **imminent hazardous situation**. If not avoided, it **will result in death or serious injury**.
		WARNING	Indicates a **potential hazardous situation**. If not avoided, it **can result in death or serious injury**.
		CAUTION	Indicates a **probable hazardous situation** or calls the attention to unsafe practices. If not avoided, it **may result in injury**.
Prohibited Action	 (typical)	Indicates a dangerous action. Hence, **you must not**!	
Mandatory Action	 (typical)	Indicates a mandatory action. Hence, **you must**!	
Information		Requirement / Note / Remark	Indicates an activity you must perform prior continuing, or gives information on a particular item you need to observe.
		Best Practice	Indicates an advice or recommendation on the easiest and best way to further proceed.
		Material Damage	Indicates information particular to possible damage of the equipment.

Table 1-2 Symbols & Signs

1.5 Trademarks and Brand Names

For easier legibility, registered brand names are listed below and will not be further tagged with their respective trademark. It must be understood that the brands (the below list is not necessarily concluding) are protected by copyright and/or other intellectual property rights even if their legal trademarks are omitted in the later course of this document.

Brand Name	Trademark Owner
CANopen® CiA®	© CiA CAN in Automation e.V, DE-Nuremberg
Micro-Fit™ Mini-Fit Jr.™	© Molex, USA-Lisle, IL

Table 1-3 Brand Names and Trademark Owners

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1.6 Copyright

CCMC | EPOS2 P 24/5 Cable Starting Set | Edition 2025-01 | DocID rel127123

2 INTRODUCTION

The present document provides you with information on the wiring details for each cable which will be used with the EPOS2 P 24/5 hardware. It contains pictures, drawings, cable specification, pin assignment and detailed connector information. The included «Cable Selector» will help you to choose the correct cable for the setup you are using.

Find the latest edition of the present document, as well as additional documentation and software to the EPOS2 P 24/5 Positioning Controller also on the Internet: ➔www.maxonmotor.com

2.1 Documentation Structure

The present document is part of a documentation set. Please find below an overview on the documentation hierarchy and the interrelationship of its individual parts:

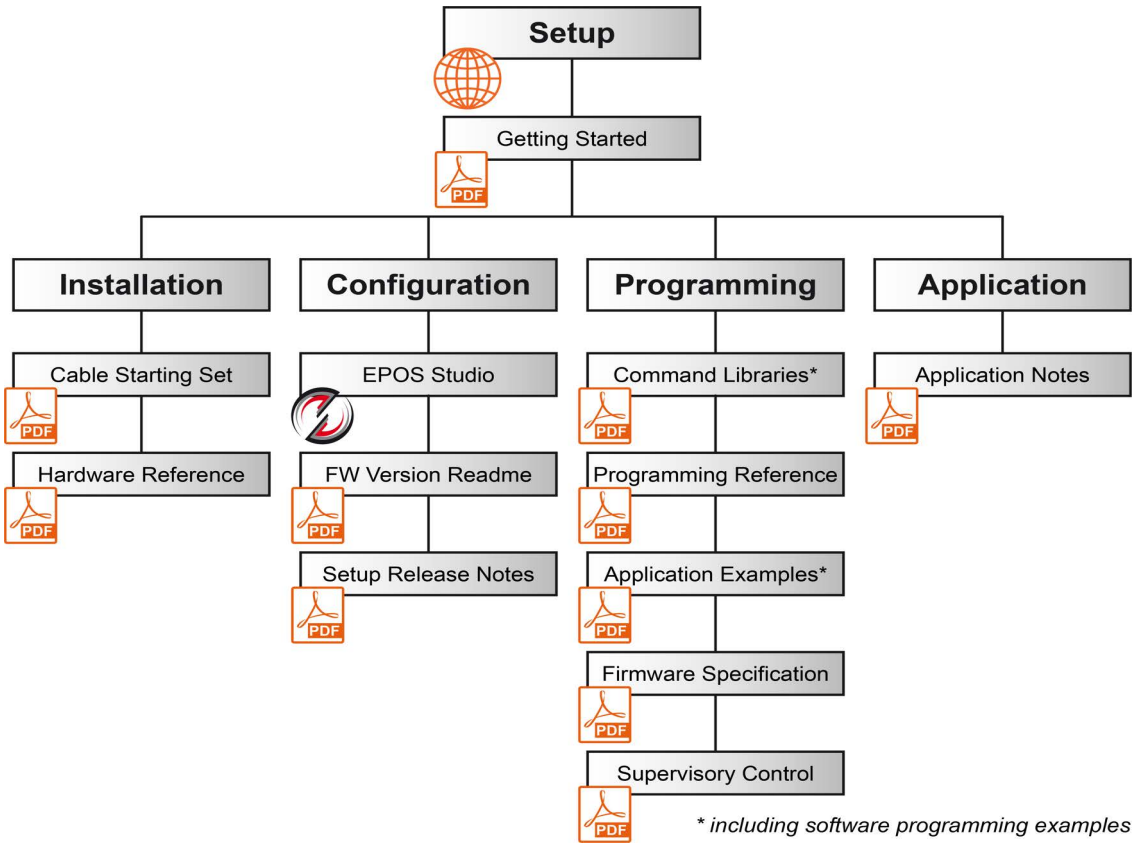

Figure 2-1 Documentation Structure

2.2 Safety Precautions

Prior continuing …

- make sure you have read and understood Chapter " PLEASE READ THIS FIRST" on page A-2,
- do not engage with any work unless you possess the stated skills (➔Chapter "1.2 Target Audience" on page 1-4),
- refer to Chapter "1.4 Symbols and Signs" on page 1-5 to understand the subsequently used indicators,
- you must observe any regulation applicable in the country and/or at the site of implementation with regard to health and safety/accident prevention and/or environmental protection,
- take note of the subsequently used indicators and follow them at all times.

DANGER

High Voltage and/or Electrical Shock
Touching live wires causes death or serious injuries!

- *Consider any power cable as connected to live power, unless having proven the opposite!*
- *Make sure that neither end of cable is connected to live power!*
- *Make sure that power source cannot be engaged while work is in process!*
- *Obey lock-out/tag-out procedures!*
- *Make sure to securely lock any power engaging equipment against unintentional engagement and tag with your name!*

Requirements

- *Make sure that all associated devices and components are installed according to local regulations.*
- *Be aware that, by principle, an electronic apparatus can not be considered fail-safe. Therefore, you must make sure that any machine/apparatus has been fitted with independent monitoring and safety equipment. If the machine/ apparatus should break down, if it is operated incorrectly, if the control unit breaks down or if the cables break or get disconnected, etc., the complete drive system must return – and be kept – in a safe operating mode.*
- *Be aware that you are not entitled to perform any repair on components supplied by maxon motor.*

Electrostatic Sensitive Device (ESD)

- *Make sure to wear working cloth in compliance with ESD.*
- *Handle device with extra care.*

3 CABLES

3.1 Important Notice: Prerequisites for Permission to commence Installation

The EPOS2 P 24/5 is considered as partly completed machinery according to EU directive 2006/42/EC, Article 2, Clause (g) and therefore **is only intended to be incorporated into or assembled with other machinery or other partly completed machinery or equipment**.

WARNING

Risk of Injury
Operating the device without the full compliance of the surrounding system with EU directive 2006/42/EC may cause serious injuries!

- *Do not operate the device, unless you have made sure that the other machinery fulfills the requirements stated in the EU directive!*
- *Do not operate the device, unless the surrounding system fulfills all relevant health and safety aspects!*
- *Do not operate the device, unless all respective interfaces have been established and fulfill the stated requirements!*

3.2 Tools

If you should decide not to use the ready-made cable assemblies, we strongly recommenced to employ the following hand tools.

Tools	
Crimper	Molex hand crimper (63819-0000)
	Molex hand crimper (63819-0900)

Table 3-4 Recommended Tools

3.3 Cable Selector

Use the following table to find the matching cables for the maxon motor variant and type of equipment you will be using:

Cable			Motor			Communication		
Designation	**Order #**	**Connector**	**DC** motor **with separated** motor/encoder cable	**DC** motor **with integrated** motor/encoder ribbon cable	**EC** motor **with separated** motor/encoder cable	**USB**	**RS232**	**CAN**
Power Cable	275829	J1	X	X	X			
Motor Cable	275851	J2	X		X			
Hall Sensor Cable	275878	J3			X			
Encoder Cable	275934	J4	X	X	X			
Signal Cable 16core	275932	J5	O	O	O			
RS232-COM Cable	275900	J6					X	
USB Type A - mini B Cable	370513	J9				X		
CAN-COM Cable	275908	J7 or J8						X
CAN-CAN Cable	275926	J7 or J8						O
CAN-Y Cable	319471	J7 or J8						O
Legend: X = use / O = optionally								

Table 3-5 Cable Selector

3.4 Cable Assemblies

3.4.1 Power Cable (275829) – Connector J1

Head A **Head B**

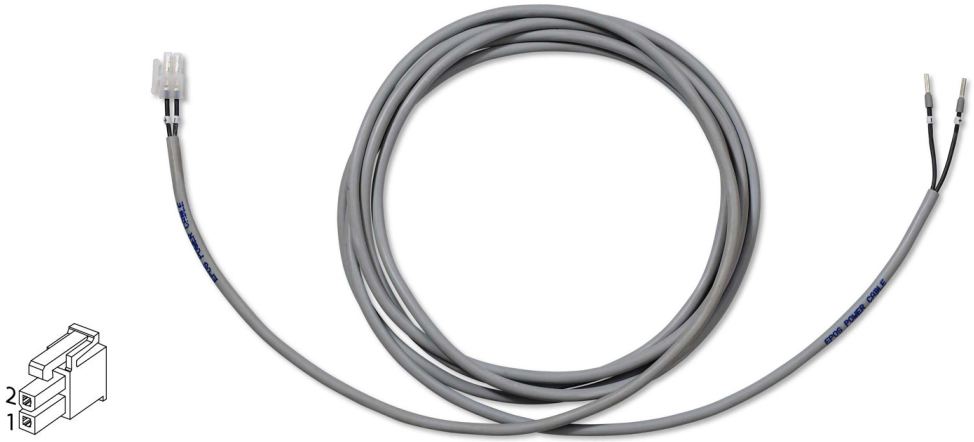

Figure 3-2 Power Cable

Technical Data	
Cable cross-section	2 x 0.75 mm^2
Length	3 m
Head A	Molex Mini-Fit Jr. 2 poles (39-01-2020) Molex Mini-Fit Jr. female crimp terminals (44476-xxxx)
Head B	Cable end sleeves 0.75 mm^2

Table 3-6 Power Cable – Technical Data

Wire	Head A Pin	Head B Pin	Twisted Pair	Signal	Description
black	1	–	–	Power_Gnd	Ground of supply voltage
black	2	+	–	$+V_{CC}$	Supply voltage +11…+24 VDC

Table 3-7 Power Cable – Pin Assignment, J1

3.4.2 Motor Cable (275851) – Connector J2

Head A **Head B**

Figure 3-3 Motor Cable

Technical Data	
Cable cross-section	3 x 0.75 mm^2 shielded
Length	3 m
Head A	Molex Mini-Fit Jr. 4 poles (39-01-2040) Molex Mini-Fit Jr. female crimp terminals (44476-xxxx)
Head B	Cable end sleeves 0.75 mm^2

Table 3-8 Motor Cable – Technical Data

Wire	Head A Pin	Head B Pin	Twisted Pair	Signal	Description
white	1		–	Motor winding 1 (+M)	EC motor: Winding 1 DC motor: Motor +
brown	2		–	Motor winding 2 (−M)	EC motor: Winding 2 DC motor: Motor −
green	3		–	Motor winding 3	EC motor: Winding 3
black	4		–	Motor shield	Cable shield

Table 3-9 Motor Cable – Pin Assignment, J2

Note
For EMC-compliant installation, the cable shield should be connected to the motor housing.

3.4.3 Hall Sensor Cable (275878) – Connector J3

Head A **Head B**

Figure 3-4 Hall Sensor Cable

Technical Data	
Cable cross-section	5 x 0.14 mm^2 shielded
Length	3 m
Head A	Molex Micro-Fit 3.0 6 poles (430-25-0600) Molex Micro-Fit 3.0 female crimp terminals (43030-xxxx)
Head B	Cable end sleeves 0.14 mm^2

Table 3-10 Hall Sensor Cable – Technical Data

Wire	Head A Pin	Head B Pin	Twisted Pair	Signal	Description
green	1		–	Hall sensor 1	Hall sensor 1 Input
brown	2		–	Hall sensor 2	Hall sensor 2 Input
white	3		–	Hall sensor 3	Hall sensor 3 Input
yellow	4		–	GND	Ground of Hall sensor supply
grey	5			$+V_{Hall}$	Hall sensor supply voltage +5 VDC / 30 mA
black	6			Hall shield	Cable shield

Table 3-11 Hall Sensor Cable – Pin Assignment, J3

Note
For EMC-compliant installation, the cable shield should be connected to the motor housing.

3.4.4 Encoder Cable (275934) – Connector J4

Head A **Head B**

Figure 3-5 Encoder Cable

Technical Data	
Cable cross-section	10 x AWG28, round-jacket, twisted pair flat cable, pitch 1.27 mm
Length	3.20 m
Head A	DIN 41651 female connector, pitch 2.54 mm, 10 poles, plug strain relief
Head B	DIN 41651 Plug, pitch 2.54 mm, 10 poles, plug strain relief

Table 3-12 Encoder Cable – Technical Data

Wire	Head A Pin	Head B Pin	Twisted Pair	Signal	Description
brown	1	1	1	Motor +	DC motor: Motor + *1)
white	2	2		+5 VDC / 100 mA	Encoder supply voltage
red	3	3	2	GND	Ground
white	4	4		Motor −	DC motor: Motor − *1)
orange	5	5	3	Channel A\	Channel A complement
white	6	6		Channel A	Channel A
yellow	7	7	4	Channel B\	Channel B complement
white	8	8		Channel B	Channel B
green	9	9	5	Channel I\	Index complement
white	10	10		Channel I	Index
Remark *1) only with maxon DC motors with digital MR encoder with Line Driver type S and M					

Table 3-13 Encoder Cable – Pin Assignment, J4

Note

Encoder Cable head B. The pin out suits, for example:

- *maxon digital MR Encoder type S, M, ML, L all with Line Driver*
- *maxon digital encoder HEDL 55_ with Line Driver RS 422*

3.4.5 Signal Cable 16core (275932) – Connector J5

Head A **Head B**

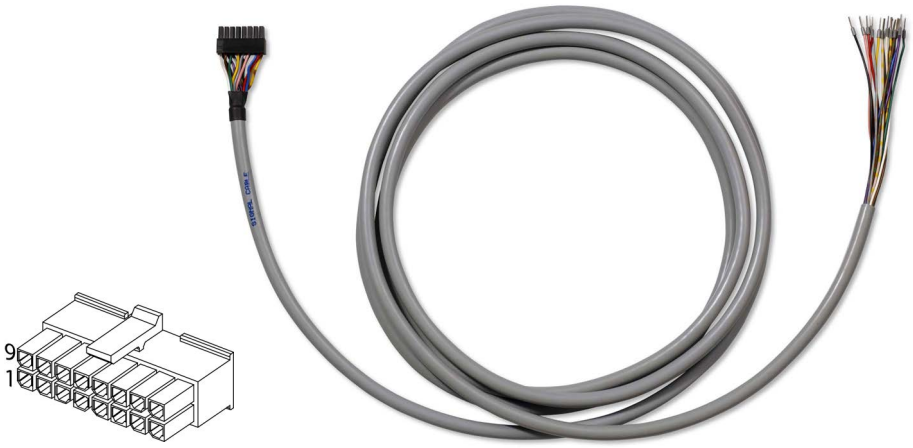

Figure 3-6 Signal Cable 16core

Technical Data	
Cable cross-section	16 x 0.14 mm^2
Length	3 m
Head A	Molex Micro-Fit 3.0 16 poles (430-25-1600) Molex Micro-Fit 3.0 female crimp terminals (43030-xxxx)
Head B	Cable end sleeves 0.14 mm^2

Table 3-14 Signal Cable 16core – Technical Data

Wire	Head A Pin	Head B Pin	Twisted Pair	Signal	Description
white	1		–	D_Gnd	Digital signal ground
brown	2		–	D_Gnd	Digital signal ground
green	3		–	DigIN6	Digital Input 6 “Negative Limit Switch”
yellow	4		–	DigIN5	Digital Input 5 “Positive Limit Switch”
grey	5		–	DigIN4	Digital Input 4 “Home Switch”
pink	6		–	DigIN3	Digital Input 3 “General Purpose”
blue	7		–	DigIN2	Digital Input 2 “General Purpose”
red	8		–	DigIN1	Digital Input 1 “General Purpose”
black	9 *1)		–	$+V_{out}$	Auxiliary supply voltage output (+11…+24 VDC)
	9 *2)			$+V_C$	Logic supply voltage input (+11…+24 VDC)
violet	10		–	DigOUT4	Digital Output 4 “Brake”
grey/pink	11		–	DigOUT3	Digital Output 3 “General Purpose”
red/blue	12		–	DigOUT2	Digital Output 2 “General Purpose”
white/ green	13		–	DigOUT1	Digital Output 1 “General Purpose”
brown/ green	14		–	A_Gnd	Analog signal ground
white/ yellow	15		–	AnIN 2	Analog Input 2
yellow/ brown	16		–	AnIN 1	Analog Input 1

Remarks:
*1) jumper JP4 is set (initial setting)
*2) if jumper JP4 is open, a separate logic supply voltage may be applied

Table 3-15 Signal Cable 16core – Pin Assignment, J5

3.4.6 RS232-COM Cable (275900) – Connector J6

Head A **Head B**

Figure 3-7 RS232-COM Cable

Technical Data	
Cable cross-section	2 x 2 x 0.14 mm^2, twisted pair, shielded
Length	3 m
Head A	Molex Micro-Fit 3.0 6 poles (430-25-0600) Molex Micro-Fit 3.0 female crimp terminals (43030-xxxx)
Head B	Female D-Sub connector DIN 41652, 9 poles, with mounting screws

Table 3-16 RS232-COM Cable – Technical Data

Wire	Head A Pin	Head B Pin	Twisted Pair	Signal	Description
yellow	1	3	1	EPOS RxD	EPOS RS232 receive
white	2	2	2	EPOS TxD	EPOS RS232 transmit
green	4	5	1	GND	RS232 ground
brown	5	5	2	GND	RS232 ground
black	6	–	–	Shield	Cable shield
–	–	Housing	–	Shield	Cable shield, soldered to connector housing
Remark pin assignment according to RS232 Standard					

Table 3-17 RS232-COM Cable – Pin Assignment, J6

3.4.7 USB Type A - mini B Cable (370513) – Connector J9

Head A **Head B**

Figure 3-8 USB Type A - mini B Cable

Technical Data	
Cable cross-section	1 x 28 AWG non-twisted power pair / 1 x 28 AWG twisted data pair, aluminum-metalized polyester inner shield, 28 AWG stranded tinned copper drain wire, > 65%, tinned copper wire interwoven (braided) outer shield, PVC jacket
Length	3 m
Head A	USB Type mini B, male
Head B	USB Type A, male

Table 3-18 USB Type A - mini B Cable – Technical Data

Wire	Head A Pin	Head B Pin	Twisted Pair	Signal	Description
red	1	1	–	V_{BUS}	USB BUS supply voltage input +5 VDC
white	2	2	1	D−	USB Data−
green	3	3		D+	USB Data+
–	4	–	–	ID	not connected
black	5	4	–	GND	USB_Ground
Shell	Shield	Shield	–	Cable shield	Cable shield, soldered to connector housing
Remark: pin assignment according to USB 2.0 standard					

Table 3-19 USB Type A - mini B Cable – Pin Assignment, J9

3.4.8 CAN-COM Cable (275908) – Connector J7 or J8

Head A **Head B**

Figure 3-9 CAN-COM Cable

Technical Data	
Cable cross-section	2 x 2 x 0.22 mm^2, twisted pair, shielded
Length	3 m
Head A	Molex Micro-Fit 3.0 4 poles (430-25-0400) Molex Micro-Fit 3.0 female crimp terminals (43030-xxxx)
Head B	Female D-Sub connector DIN 41652, 9 poles, with mounting screws

Table 3-20 CAN-COM Cable – Technical Data

Wire	Head A Pin	Head B Pin	Twisted Pair	Signal	Description
yellow	1	7	1	CAN high	CAN high bus line
green	2	2		CAN low	CAN low bus line
brown	3	3	–	CAN GND	CAN ground
black	4	5	–	CAN shield	Cable shield
Remark pin assignment according to CiA DS102					

Table 3-21 CAN-COM Cable – Pin Assignment, J7/8

3.4.9 CAN-CAN Cable (275926) – Connector J7 or J8

Head A **Head B**

Figure 3-10 CAN-CAN Cable

Technical Data	
Cable cross-section	2 x 2 x 0.22 mm^2, twisted pair, shielded
Length	3 m
Head A / Head B	Molex Micro-Fit 3.0 4 poles (430-25-0400) Molex Micro-Fit 3.0 female crimp terminals (43030-xxxx)

Table 3-22 CAN-CAN Cable – Technical Data

Wire	Head A Pin	Head B Pin	Twisted Pair	Signal	Description
yellow	1	1	1	CAN high	CAN high bus line
green	2	2		CAN low	CAN low bus line
brown	3	3	–	CAN GND	CAN ground
black	4	4	–	CAN shield	Cable shield

Table 3-23 CAN-CAN Cable – Pin Assignment, J7/8

3.4.10 CAN-Y Cable (319471) – Connector J7 or J8

Head A
Head B

Head C

Figure 3-11 CAN-Y Cable

Technical Data	
Cable cross-section	2 x 4 x 0.14 mm^2, single wires
Length	0.05 m
Head A / Head B	Molex Micro-Fit 3.0 4 poles (430-25-0401) Molex Micro-Fit 3.0 male crimp terminals (43031-xxxx)
Head C	Molex Micro-Fit 3.0 4 poles (430-25-0400) Molex Micro-Fit 3.0 female crimp terminals (43030-xxxx)

Table 3-24 CAN-Y Cable – Technical Data

Wire	Head A Pin	Head B Pin	Head C Pin	Twisted Pair	Signal	Description
yellow	2	2	1	–	CAN high	CAN high bus line
green	1	1	2	–	CAN low	CAN low bus line
brown	4	4	3	–	CAN GND	CAN ground
black	3	3	4	–	CAN shield	Cable shield

Table 3-25 CAN-Y Cable – Pin Assignment, J7/8

Note
The CAN-Y Cable fits the other CAN cables.

3.5 EPOS2 24/5 Connector Set (384915)

If you decide not to use the ready-made cable assemblies, you can take advantage of a prepackaged set containing all required connectors.The set contains following items:

Connector	Specification	Quantity
J1	Molex Mini-Fit Jr. 2 poles (39-01-2020)	1
J2	Molex Mini-Fit Jr. 4 poles (39-01-2040)	1
J3 / J6	Molex Micro-Fit 3.0 6 poles (430-25-0600)	2
J5	Molex Micro-Fit 3.0 16 poles (430-25-1600)	1
J7 / J8	Molex Micro-Fit 3.0 4 poles (430-25-0400)	2
	Molex Mini-Fit Jr. female crimp terminal (44476-1111) AWG 20-18	8
	Molex Micro-Fit 3.0 female crimp terminal (43030-0010) AWG 30-26	38

Table 3-26 EPOS2 24/5 Connector Set – Content

Best Practice

For best results use original manufacturer's tools (➔Chapter "3.2 Tools" on page 3-9).

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